

REMARKS

Claims 1-12 and 14-18 are pending.

Claims 1-12 and 14-18 are rejected.

Claims 1-12 and 14-18 are rejected under 35 USC 103(a) as obvious over Yamada, US 5,334,519 in view of Seki, US 5,352,828 and Leonova, Biotechnology, 1000, 88:231-241.

The present claim limitations require that the monomer is obtained from a biocatalyzed reaction or a fermentation process, and the monomer contains cellular material and/or components of a fermentation broth, and the polymer is formed by polymerizing the monomer in the presence of cellular material and/or components of a fermentation broth in the presence of initiators and the formed polymer exhibits an intrinsic viscosity of at least 3 dl/g.

Examiner states that in the process of Yamada after the substrate is converted into a monomer, it contains cellular material and/or components.

Examiner agrees that Yamada does not teach the formation of a polymer in the vessel comprising the ethylenically unsaturated monomer wherein the unsaturated monomer comprises cellular material and/or components of the fermentation broth.

However, Seki teaches that solutions of acrylamide will occur under most conditions, such as in the presence of iron. Thus according to the Examiner it is either inherent to the teachings of Yamada, or polymerization would occur during routine optimization and experimentation. Applicants submit that one skilled in the art needs to consider Yamada as it is. Not as the examiner speculates it might be.

There is no suggestion whatsoever in any of the references cited by the examiner to polymerize a monomer formed by a biocatalysed reaction or fermentation process in the presence of the cellular material and/or components or a fermentation broth.

In fact, Yamada teaches that **No** polymerization takes place as the monomer is produced in 100% yield (example 4). One skilled in the must take Yamada as it explicitly teaches.

The use of Seki's teachings by examiner that polymerization was **likely** to occur in a concentrated monomer mixture and thus **could** have occurred in the highly concentrated monomer mixture of Yamada as it contained debris from the fermentation process is at a minimum speculative.

Seki teaches in col. 1, lines 34 to 45 of Seki:

"that microbiological methods, on the other hand, have no impurities such as metal ions as a matter of course, and the amount of by-products is makedly small in comparison with the copper catalyst process (for producing acrylamide) because the enzyme reaction is effected under ordinary temperature and pressure, thus rendering possible simplification of a refining step or even its omission. However, when a high performance polymer is produced for use in the aforementioned coagulating agent and the like, it is necessary to increase the purity of acrylamide as much as possible."

Examiner stated in his rejection, page 8 under "Response to Arguments"

.". Seki teaches that the claimed polymer is popcorn-like (co. 5, lines 14-21); it therefore appears that the polymer, once separated from the mixture, would exhibit a solidity that would place it within the claimed viscosity range."

The example of "popcorn formation" referred to by the examiner in Seki (col. 5, lines 14-21) is one in which the pure **acrylamide (separated from the cellular components)** is **purposely** exposed to an iron surface at 50 °C.

Applicants point out that popcorn-polymer is an abnormal reaction encountered in free-radical polymerization systems. The popcorn-polymer has a popcorn- (hence the name) or cauliflower-like shape, and a white, opaque appearance that is easily distinguished from clear polymer obtained from normal polymerization.

Popcorn polymer does not swell in solvents. Thus the examiner's statement that "the polymer, once separated from the mixture, would exhibit a solidity that would place it within the claimed viscosity range" is indeed speculative.

As explained in the present disclosure it is generally accepted that elimination of the purification step would not work because the presence of even small quantities of impurities would affect the polymerization.

As discusses in the present disclosure on page 4, lines 11-24:

"It is standard practice to remove the biocatalytic cells from the growth medium before using the biomass to produce the monomers in order to avoid contamination of the monomer by impurities that could adversely affect the successful polymerization of the monomer. It is generally accepted that even small quantities of impurities can affect the polymerization of monomers or prevent polymerization taking place at all. For instance initiating systems used for polymerization are used in tiny amounts and therefore it would require only small amounts of impurities to inactivate them, stopping or short-stopping the polymerization. Such impurities may result in branching , cross-linking, chain termination or other effects on the polymer."

The surprising aspect of the present invention is the fact that polymerization occurs without adverse effects on the polymer per se. This is clearly shown in the comparisons run in the examples wherein a polymer formed from a monomer formed by biocatalysis which is not separated from its fermentation broth performs as well as that which is centrifuged from fermentation broth. See Tables 2 and 3 on page 19.

Thus the applicants are the first to understand that the removal of the cellular material and/or components of a fermentation broth need not take place before polymerization. The formed polymer performs as well as the monomer subjected to the purification step.

The applicants bring to the examiner's attention that the inherency of a process and its obviousness are different questions; that which may be inherent is not necessarily known; obviousness cannot be predicated on what is unknown.

The Examiner has failed to consider the invention as a whole. That is the process of the invention eliminates a purification step, previously considered necessary. The result is a product of surprising viscosity and performance.

The issue here is not whether polymerization might have occurred or might not have occurred in the experimentation of Yamada (and Yamada **specifically states it did not occur**, while the Examiner believes that because of the teachings of Seki it was likely to occur). The applicants submit this is pure speculation on the part of the examiner.

Part of the problem with the Examiner's rejection is he has given an obviousness rejection based on inherency. If an obviousness rejection is based on inherency, the unexpected property of the present process (production of flocculants of relatively high viscosity which perform well without the

purification step) could only inhere in a post-invention rationalization, which is at most a possibility and not a proper basis for obviousness.

Further the examiner has failed to consider the invention as a whole. Yamada never suggested the polymerization of the monomer formed by biocatalysis without a purification step. Examiner believes the experimentation run in Yamada would have likely resulted in polymerization because of the statements of Seki. However, Yamada states **no** polymerization took place. Selective teachings of Seki bring into question whether polymerization would have occurred during microbiological production as postulated by the examiner. Seki teaches that these microbiological methods have no impurities such as metal ions as a matter of course. Then the examiner takes an example from Seki showing polymerization of monomer when deliberately exposed to an iron surface and uses this as justification for his opinion that polymerization would inherently occur in the methods of Yamada.

But the fact is the presently claimed process eliminates the necessity of pre-separation step, which no one skilled in the art recognized could have been eliminated and still achieve a product of high quality (high viscosity and good performance as a flocculant).

Even if polymerization might occur in the experiments of Yamada (and applicants believe this to not be the case because Yamada states **no** polymerization took place), this spontaneous polymerization would not lead to a polymer of the desired quality. See col. 5, lines 14-21 of Seki where a popcorn-like polymer is produced.

Reconsideration and withdrawal of the rejection of claims 1-12 and 14-18 is respectfully solicited in light of the remarks and amendments *supra*.

Since there are no other grounds of objection or rejection, passage of this application to issue with claims 1-12 and 14-18 is earnestly solicited.

Applicants submit that the present application is in condition for allowance. In the event that minor amendments will further prosecution, Applicants request that the examiner contact the undersigned representative.

Respectfully submitted,



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Enclosure: Response after Final and Notice of Appeal